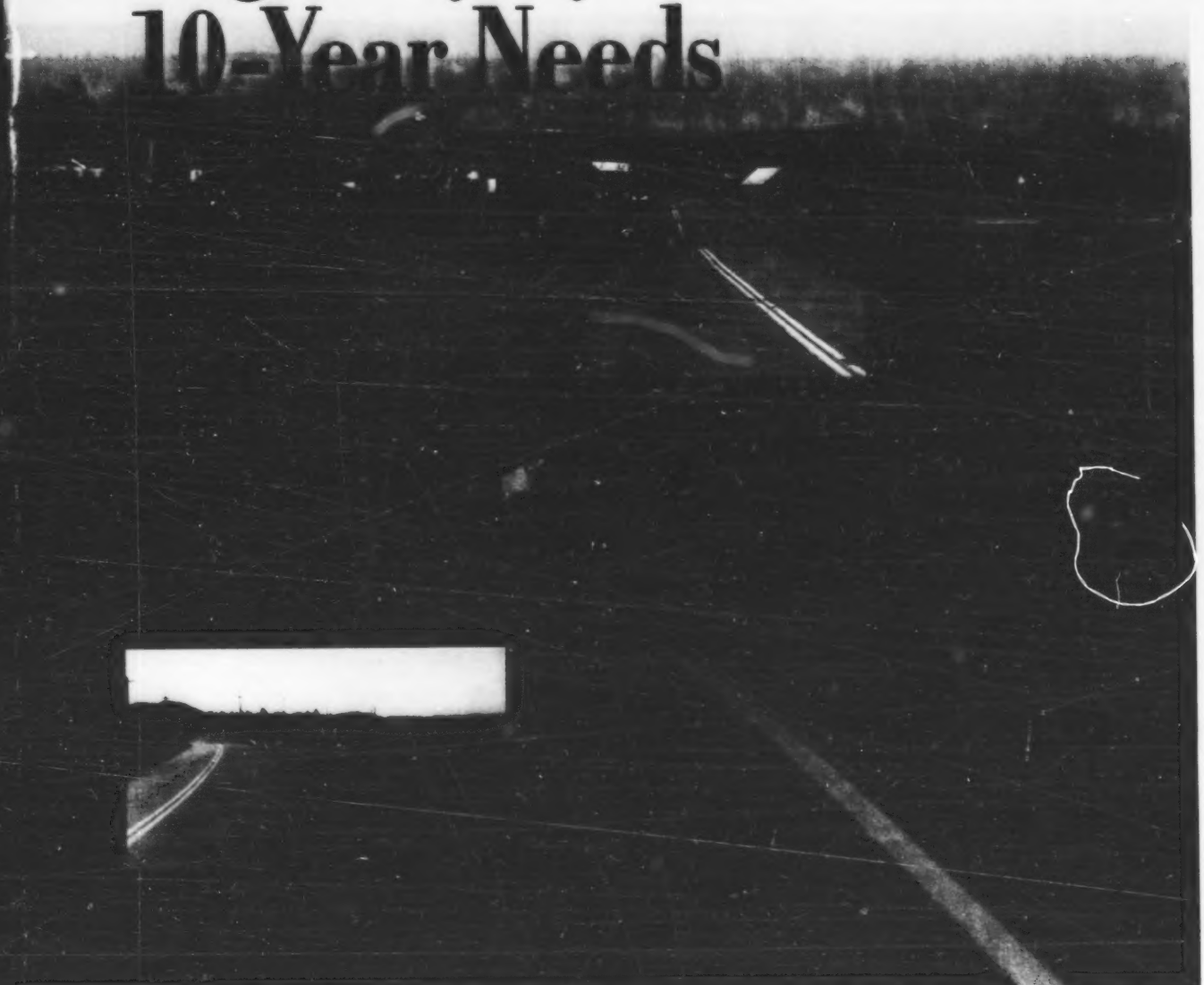
Nova Scotia's Primary and Secondary Highway Systems: 10-Year Needs



NOVA SCOTIA
Transportation and Public Works

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Nova Scotia's Primary and Secondary Highway Systems: 10-Year Needs

Department of Transportation and Public Works

May 3, 2001

Preface

Highways are a critical component of public infrastructure, contributing to our economic and social well-being. This is recognized by both government and citizen. Strong public infrastructure allows for the free flow of people, goods, and services; it connects communities and brings peace of mind to travellers.

However, Nova Scotia is faced with a problem in its public highways infrastructure. Many of the province's roads need repair and maintenance. Some areas of the province need new highways or need highways to be twinned.

As in other areas of society today, demand often exceeds opportunities. The province's ability to repair and maintain roads is overwhelmed by its fiscal concerns. Education, health, and social services demand and need attention, as do other areas of government. Roads are an important part of the provincial equation, but only one part.

In many ways, the province's infrastructure deficit mirrors the province's fiscal deficit. Both need planning and action to begin to address a long-standing problem. Both need commitment to achieve a successful conclusion.

The purpose of this *report—Nova Scotia's Primary and Secondary Highway Systems: 10-Year Needs*—is to outline the province's infrastructure deficit and detail the steps necessary to overcome it. The report will be used as a guide for future decision making about highways infrastructure, in terms of both funding and overall strategy.

Introduction

Highways play an important role in the economic and social life of the province. In the province's recent economic growth strategy, *Opportunities for Prosperity*, infrastructure is highlighted as one of seven strategic directions that will be used to build the province's vital economic sectors.

However, present funding levels cannot counter the deterioration of the existing highway system, nor provide the new highways we need. This is the single greatest contributor to what is known as our "infrastructure deficit," and, if not addressed, it will inhibit the province's economic growth.

The province did not arrive at its current infrastructure deficit overnight. Over the past 20 years, funding to highways, roads and bridges in Nova Scotia has declined. When viewed as a percentage of the total provincial budget, the department's budget has decreased from 10 per cent in the early 1980s to less than 5 per cent in 1999-2000. The net affect has been a growing infrastructure deficit.

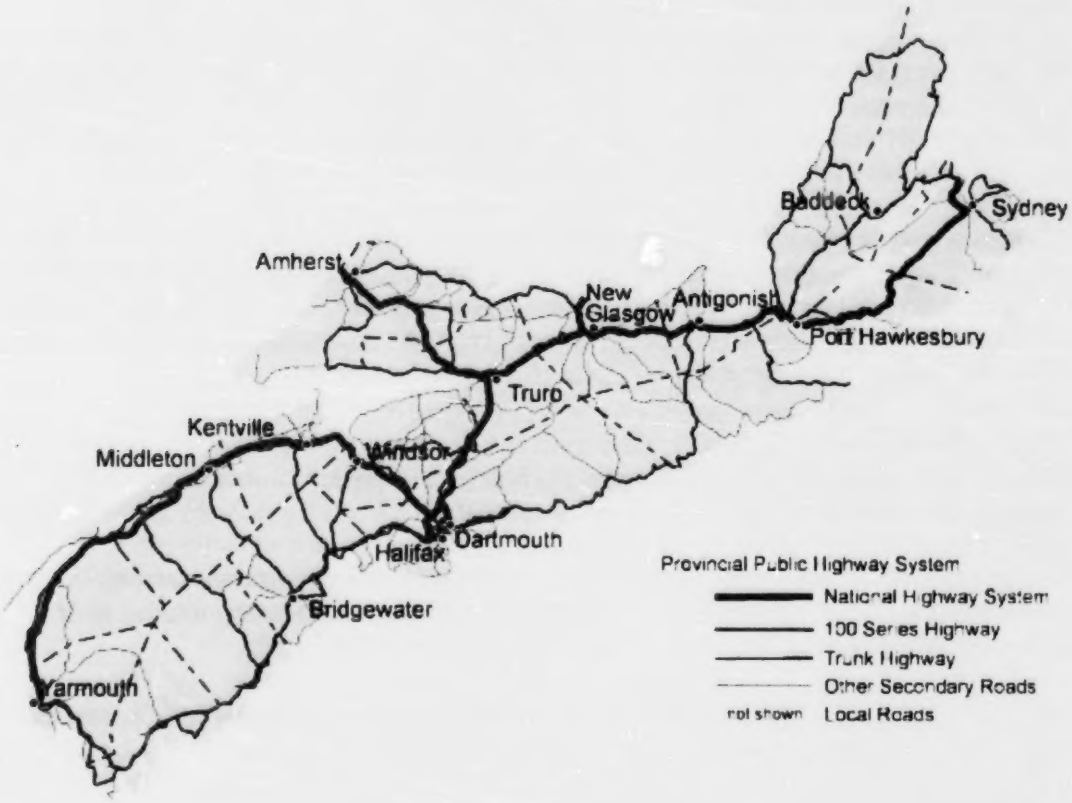
The Department of Transportation and Public Works is responsible for operating and maintaining over 23,000 kilometres of roads and 3,800 bridges. It has determined what improvements will be required over the next decade. The following report summarizes how these needs have been determined, describes sample projects, and includes funding requirements. Expenditure priorities and their implications are introduced for various funding levels.

The analysis also addresses two of the government's policy agenda items related to the provincial highway system:

- a 10-year plan for completing, upgrading and twinning 100-series highways
- a non-partisan, multi-year plan for maintenance and upgrade of secondary roads

This report will provide a basis for further critical policy analysis related to the management of the province's highways.

Provincial Public Highway System



10-Year Highway System Needs Summary

The condition of the highway system is affected by the quality of construction; traffic volumes and the amount of commercial traffic; environmental factors such as repetitive freezing and thawing; and the timeliness of repairs.

This report looks at five major program areas: system expansion; pavement preservation; new paving; gravel road rehabilitation; and bridge rehabilitation and repair. Included is an assessment of needs for the coming decade and their financial implications, as well as an indication of where priorities would be placed under alternative funding scenarios.

The annual needs presented are averages. The list contains a general description of each program or category. Some examples from around the province are provided to indicate the types of project that would be undertaken. These are examples only. Finally, a summary of 10-year program needs is provided. For each highway program, needs estimates are presented for both average yearly and total 10-year investment.

1. System Expansion

System expansion projects add capacity and improve safety performance in order to accommodate present and projected traffic volumes.

Primary highway system expansion includes construction of new highways or interchanges and twinning existing highways. Secondary highway system expansion includes upgrading, pavement strengthening, and traffic signal installation or replacement.

Costs can vary greatly. Recent examples of primary highway system expansion projects are:

- twinning and environmental protection on 8.9 km of Highway 125, Cape Breton County, $13.2 million
- primary construction on 4.3 km of Highway 104, Pictou County, $5.4 million
- construction of a one-half diamond interchange at the intersection of Highway 101 and Mary Jane Riley Road, Digby County, $878,000

Examples of recent secondary highway system expansion projects are:

- strengthening and paving of 9.4 km on Route 329, Lunenburg County, $996,000
- strengthening 1.3 km of Mary Jane Riley Road, Digby County, $232,000
- installation of traffic signals at the intersection of Mic Mac Boulevard and the northbound entrance/exit ramps from Highway 111, Halifax Regional Municipality, $85,300

The department has an annual program of traffic census monitoring and compiles and analyses highway accident information. These programs provide traffic volume information for all numbered provincial highways and partial coverage for the local road network, as well as highway safety information for all provincial highways.

Primary highway expansion needs are determined from an analysis of highway safety, capacity, travel speed, and highway policy. The analysis identified over 600 km of highway twinning, new two- and four-lane construction, and interchange construction, with an estimated cost of $789 million. This includes twinning Highway 101 from Mount Uniacke to Coldbrook at an estimated cost of $105 million.

For secondary highways, local development pressures dictate expansion needs. Access to the primary highway system is essential to the product manufacture and market cycle. This access is enhanced through strengthening pavements on the secondary highway connectors that serve key industrial, business, and resource areas of the province. As well, the focus of the province's $1-billion tourism industry is on attracting visitors to sites off the primary highways, which requires an adequate secondary road system. Estimates of secondary highway expansion needs total $260 million.

2. Pavement Preservation

Pavement preservation projects, such as surface sealing, reconstruction, and repaving, add useful life to a road without increasing its capacity.

As with system expansion projects, pavement preservation costs vary. The average cost of repaving in 1999–2000 ranged from $135,000 to $195,000 per kilometre, while the cost of sealcoat projects range from $15,000 to $45,000 per kilometre. Recent examples of other pavement-preservation project costs include:

- pulverizing and paving 7.3 km on County Line Road, Richmond County, $1.07 million

- microsurfacing 5.1 km on Highway 107, Halifax County, $226,000
- crack filling, sealing, and seal coating 16.5 km on Trunk 3, Lunenburg County, $267,000

Pavement preservation needs are influenced by previous preventative maintenance, traffic, and climate. Each year pavement condition surveys using the department's mobile Automatic Road Analyzer (ARAN) vehicle are completed for pavement rehabilitation projects. This information is used in the repaving prioritization process, which is the basis for establishing which projects are included in the capital program.

The department is moving towards conducting comprehensive pavement condition surveys across the network of paved highways and will provide a comprehensive assessment of pavement rehabilitation needs. As well, the department is working towards implementation of a pavement management system to manage the data and provide a systematic means for anticipating pavement rehabilitation needs and priorities.

Age of pavement is used as a proxy measure for pavement condition. Pavements with an age greater than the target age (12 years for 100-series highways, 20 years for secondary) require rehabilitation.

Evaluation of pavement ages revealed a need to rehabilitate 1629 kilometres of the 100-series highways over 10 years, at a cost of $301 million; and 9032 km of paved secondary highways, at a cost of $1.13 billion.

3. New Paving

The local road network includes 9600 km of gravel roads. Until recent years, the department undertook a limited annual program of paving local roads where warranted. One of the means of selecting roads for paving is by traffic volume. The traffic volume warrant used is 300 vehicles per day (annual average). Roads that present maintenance difficulty, due to ice on steep grades or drainage problems for instance, may also be paved. The estimated cost of paving local roads over the 10-year period is $50 million.

The department has provided a cost-shared program to municipalities for paving subdivision streets (J-Class roads). The program applies only to the remaining 550 km of gravel-surfaced J-Class roads constructed before April 1, 1995. TPW proposes to cost-share the paving of these roads. The cost to the province would be $27.5 million.

4. Gravel Road Rehabilitation

Gravel road rehabilitation and repair projects include an annual program of grading to provide a smooth, crowned surface, stabilizing with a chloride or similar treatment, and periodic resurfacing and ditching. Following are representative rehabilitation activities and costs:

- Strengthening 10 km of road with 100 mm of Type 2 gravel, $200,000
- ditching and resurfacing 10 km of road with 100 mm of Type 1 gravel, $300,000
- dust control on 10 km of gravel road, $5,000

Detailed condition estimates for the gravel road system are not available. Based on estimates by senior staff, the total cost to rehabilitate and repair gravel roads would be approximately $300 million.

Present funding levels cannot provide required rehabilitation. This has placed a cost burden on residents and businesses using these roads.

5. Bridge Rehabilitation and Repair

Bridge rehabilitation and repair projects include annual maintenance, as well as reconstruction or replacement. The cost of these projects can vary significantly. Recent examples are:

- replace Mantua Bridge on Avondale Road, Hants County, $1.3 million
- replace girder, deck, waterproofing, and painting on Beaver Meadows Road Overpass, Highway 104, Antigonish County, $378,000
- reconstruct bridge deck, Hanson Bridge on Trunk 2, Cumberland County, $23,400

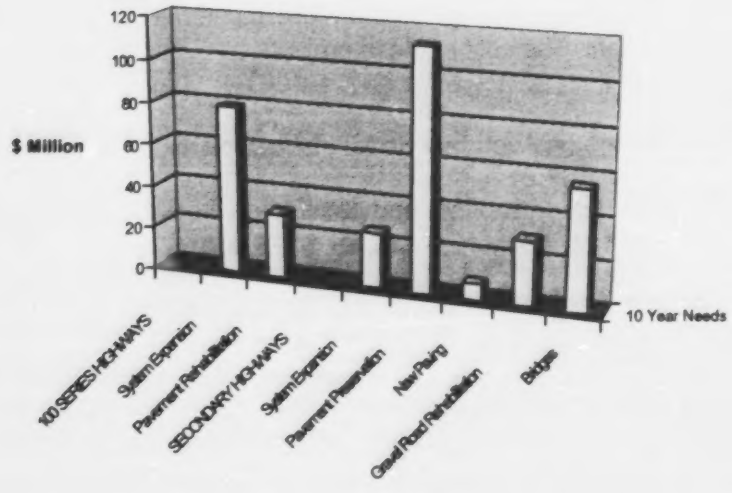
Bridge inspection teams go out and complete a comprehensive assessment on a limited number of bridges each year. Their inspection reports are used to evaluate the overall condition and determine the repair and rehabilitation needs of individual bridges. The department is implementing a comprehensive bridge management system to efficiently manage the bridge inspection data and provide a systematic method for anticipating bridge rehabilitation needs and priorities.

Detailed condition estimates for the entire bridge inventory are not available. However, the department's structural engineers estimate that $560 million is needed for bridge repair and replacement over a 10-year period.

Funding Levels and Expenditure Priorities

The following chart summarizes the province's highway improvement needs by improvement category. Over the next 10 years, TPW should spend in total an average of $342 million per year to improve highways and bridges (See Appendix A).

Summary of 10-Year Highway Improvement Needs
(Average Annual Expenditure)



The department's budget has decreased from 10 per cent of the total provincial budget in the early 1980s, to less than 4 per cent in recent years. Although there was a modest increase in the 2000–01 capital budget, over the previous three years this budget had fallen by about 10 per cent annually.[1] The net effect has been a growing infrastructure deficit.

While the gap between required and available funding is too large to be closed over the short term, we cannot avoid the issue altogether. The following funding scenarios have been developed to indicate areas of priority spending.

At low budget levels emphasis must be placed on preserving the existing highway system and operating it in a safe and efficient manner. As budget levels increase, emphasis can be shifted to stabilizing the condition of the highway system to prevent further deterioration and to improving overall system efficiency.

Scenario 1: $60 Million Plus RIM (Current Funding Level)
The focus is on preservation and maintenance. Over the long term, however, the department would not be able to maintain current conditions. This would lead to higher long-term costs to repair or replace system components, and the physical condition of highway infrastructure would continue to decline, accompanied by a decline in safety performance.

Scenario 2: $100 Million Plus RIM
Emphasis is on preserving current highways through repaving, micro surface, and chip seal projects. System expansion would be limited to the most critical capacity improvements and federal/provincial cost-shared projects. Some improvements to the secondary system could be undertaken, such as projects addressing safety issues, intersection improvements, or projects that would benefit economic development (roads to resources, strengthening projects). Long-term needs to replace aging bridges would be a low priority.

This level of funding would stabilize higher-volume roads, but the overall condition of the highway system would continue to deteriorate. This scenario would also lead to higher long-term costs to repair or replace system components.

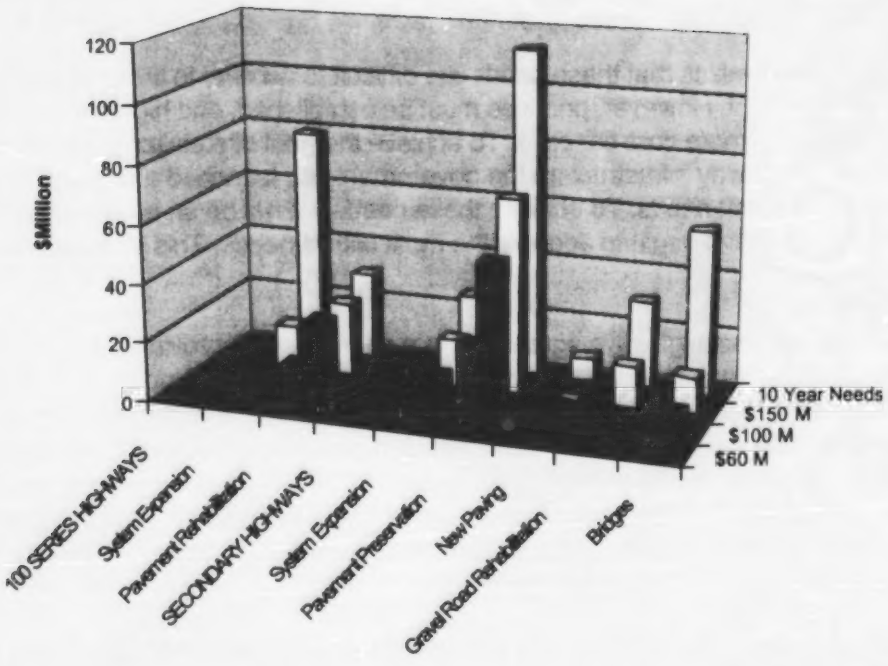
[1] In 2000–01 $9 million was added to the TPW budget in the form of the Rural Impact Mitigation (RIM) program, which provides funding for highway maintenance projects. In 2001–02, $10 million for RIM projects, a $1 million increase, and $11 million for capital projects will be added to the TPW budget.

Scenario 3: $150 Million Plus RIM

This scenario would permit the department to begin stabilizing current infrastructure and to fund high-priority system expansion projects.

Repaving funding levels would permit a move away from a "worst first" strategy and allow strengthening projects on trunk and route highways. New paving would be undertaken only on projects that would eliminate maintenance problems (i.e., drainage, difficult snow and ice control). Some improvements on gravel roads could be undertaken (ditching, strengthening, dust control). Some bridge replacement would be possible, but the focus would be primarily on strengthening and repair.

Average Yearly Expenditure Allocation by Funding Scenario



Summary

Over the next 10 years Nova Scotia's primary and secondary highway system will need a $3.4 billion investment. An adequate and sustained level of funding is imperative for the long-term renewal of our highways. Equally important is the need for information that measures the condition and performance of our highway infrastructure. This information allows us to make the strategic choices in planning our course ahead.

It is also important to remember the long-term consequences of failing to achieve an adequate and sustained level of funding for highways. At the current rate of funding, the infrastructure deficit will rise to $4.3 billion, from $3.4 billion, in 10 years. That is an increase of about $900 million.

Government recognizes that these needs are difficult to achieve in times of serious economic constraint. However, priorities must be established, and highway infrastructure spending must be more cost-effective. To achieve the goal of stabilizing and improving Nova Scotia's highway infrastructure the government has launched a strategy to address the province's urgent needs. To achieve these needs will not be an easy process. This strategy, however, will begin to address the most critical needs. This strategy includes the following measures:

- A new national highways agreement is a priority for the province. It is fair and appropriate that the federal government participate in the funding of highways that are part of the National Highway System. Therefore, **the province is requesting** that Ottawa sign a five-year, $270-million highways agreement to be cost-shared on a 50:50 basis. The proposal would allow for $180 million of repaving and $90 million of new construction on the National Highway System. The cost-sharing agreement will allow the province to further lever its highway infrastructure spending to undertake more work with limited resources.

- The government has made a commitment to spend more monies on roads. Therefore, in 2001–02 government began increasing TPW's capital budget for highways and bridges. Over three years, this will result in an additional $31 million invested in Nova Scotian highways.

- TPW is committed to running a cost-effective operation. New methods of doing business have and will continue to be examined. Therefore, work on such projects as the Road Weather Information System, Superpave asphalt binder specifications,

and End Product Specifications for highway paving will continue and will be expanded.

- Government is committed to addressing the deficit and debt. As the province's fiscal situation improves, government will be able to put additional funding into highway infrastructure. This will allow continued investment in programs such as Rural Impact Mitigation (RIM), which allocated $9 million in 2000–01 to maintenance and repair of rural local roads and $10 million in 2001–02.

The magnitude of our highway improvement needs presents a serious challenge to the department and to government. Our public highway infrastructure is important to our way of life and to our economy. Nova Scotia exports $4 billion in goods each year, and our roads are critical in getting those goods to market. They are also essential for tourism, trade and the movement of people, goods and services. Therefore, this issue demands action and commitment.

Appendix A
Average Yearly Expenditure Allocation by Funding Scenario

	Funding Level ($M/year)			
	$60	$100	$150	10 Yr Needs
100 SERIES HIGHWAYS				
System Expansion				
Twinning & New Construction	0.0	4.0	10.0	69.1
Interchange	1.0	1.0	5.0	9.8
Pavement Rehabilitation				
Re-paving	13.0	20.0	20.0	24.4
Surface Treatment	3.5	5.0	5.0	5.7
Total 100 Series	17.5	30.0	40.0	109.0
SECONDARY HIGHWAYS				
System Expansion				
New Construction	3.0	4.0	6.0	6.0
Economic Development	3.0	6.0	10.0	19.0
Traffic Signals	0.5	0.5	0.5	1.0
Pavement Preservation				
Re-paving	26.0	46.0	62.0	98.7
Surface Treatment	3.5	5.0	5.0	14.5
New Paving				
Local Road	0.0	0.0	0.0	5.0
Cost Shared - Municipalities	0.0	0.0	0.0	2.8
Gravel Road Rehabilitation				
Strengthening	0.0	0.0	6.0	9.3
Ditching and Gravel	0.0	0.0	6.0	18.7
Dust Control	0.0	0.0	2.0	2.1
Bridges				
Repair & Replacement	6.5	8.5	10.5	52.8
Ferry Replacement Program	0.0	0.0	2.0	3.5
Total Secondary Highways	42.5	70.0	110.0	233.4